IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Tomoyuki OHZEKI

Application No.: 10/635,486

Filed: August 7, 2003

For: PHOTOTHERMOGRAPHIC MATERIAL

Docket No.: FSF-031421

Group Art Unit: 1752

Examiner: Thorl Chea

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner of Patents and Trademarks

Alexandria, VA 22313-1450

Sir:

I, Tomoyuki Ohzeki, do declare and state as follows:

I graduated from Waseda University with a Master's Degree in Science and Engineering, Department of Chemistry in March 1988;

I joined Fuji Photo Film Co., Ltd. (currently FUJIFILM Corporation) in April 1988, and since 1988, I have been engaged in research and development in the field of silver halide emulsions and photothermographic materials;

I am a person of ordinary skill in the photothermographic material art;

I am familiar with the Office Action of March 20, 2007, and understand that the Examiner has rejected the claims as being unpatentable over the combination of prior art references; and

I am the inventor of the invention, and am familiar with the technical field that the present invention belongs to.

I make the following statement in order to clarify the advantages of the present invention.

Experiment A:

Photothermographic material samples 101 to 157 were prepared in the same manner as the preparation of sample 1 (using organic silver salt redispersion 1) described in Example 1 of the present application, except for changing the halogen composition molar ratio of the silver halide, the average grain size of the photosensitive silver halide, the behenic acid content of the needle-shaped organic silver salt, the lengths of the short and long axes of the needle-shaped organic silver salt, the variation coefficient of the size of the needle-shaped organic silver salt and the ratio (in terms of mol%) of the silver halide to the organic silver salt as described in Table A below. The samples obtained were evaluated with respect to fogging, sensitivity, print-out and Dmax, according to the evaluation methods described in Example 1 of the present application after the same thermal development as that described in Example 1. In samples 101 to 117, the silver halide had the same silver iodide content (2 mol%), the same average grain size (50 nm or 70 nm) and the same silver behenate content (calculated content = 82 mol%) as in Example 1 of Toya et al. The results obtained are shown in Table A below.

As is clear from the obtained results, comparative samples 101 to 117 showed significantly high fogging and, as a result, significantly inferior

balance of fogging, sensitivity and Dmax. In these samples, the silver iodide content was less than 80 mol%, the average grain size of the photosensitive silver halide was 50 nm or more and the silver behenate content was over 70 mol%. In addition, comparative samples 101 to 117 showed significantly large print-out (deterioration of the image due to fogging caused by photo-irradiation after thermal development). Further, when comparative sample 115 is compared with comparative samples 101 to 114 and 116 to 117, such inferior characteristics were not affected by whether or not the shape of the organic silver salt was a needle crystal having the shorter and longer axes defined in the present claims and having the variation coefficient defined in the present claims.

On the other hand, in samples 118 to 125, 128 to 135, 138 to 145 and 148 to 155, the silver iodide content was 80 mol% or more, the average grain size of the photosensitive silver halide was 45 nm or less and the silver behenate content was 70 mol% or less. Among these samples, comparative samples 118, 121, 122, 125, 128, 131, 132, 135, 138, 141, 142, 145, 148, 151, 152 and 155, in which the shape of the organic silver salt is outside the scope of the needle crystal organic silver salt defined in the presently claimed invention (i.e., at least one of the shorter axis, the longer axis or the variation coefficient is outside the range defined in the presently claimed invention), showed inferior balance of fogging, sensitivity and Dmax (e.g., fogging is too severe and/or sensitivity is too low). In contrast, samples 119 to 120, 123 to 124, 129 to 130, 133 to 134, 139 to 140, 143 to 144, 149 to 150 and 153 to 154, which included the needle crystal organic silver salt according to the invention (i.e., the shorter axis, the longer axis and the

variation coefficient are respectively within the ranges defined in the presently claimed invention), showed sufficient sensitivity and Dmax while suppressing fogging to a low level, and, as a result, showed good balance of fogging, sensitivity and Dmax. As a person skilled in the art, I found that the improvement in the balance of fogging, sensitivity and Dmax achieved by the presently claimed invention was unexpectedly superior.

Regarding the ratio (mol%) of the silver halide to the organic silver salt mentioned in the presently claimed invention, the following observations were made:

samples (a) 123 to 124, (b) 133 to 134, (c) 143 to 144 and (d) 153 to 154 according to the invention having a ratio (mol%) of the silver halide to the organic silver salt within the range defined in the invention showed low fogging and significantly high sensitivity and Dmax, and, as a result, showed significantly improved balance of fogging, sensitivity and Dmax, compared respectively to comparative samples (a') 126 to 127, (b') 136 to 137, (c') 146 to 147 and (d') 156 to 157 having a ratio of the silver halide to the organic silver salt outside the range defined in the invention. As a person skilled in the art, I found that the improvement in the balance of fogging, sensitivity and Dmax achieved by the presently claimed invention was unexpectedly superior.

Regarding the silver iodide content and the ratio of the silver halide to the organic silver salt, the following observations were made:

samples 119 and 123 according to the invention, which has a silver iodide content of 80 mol% or more and a ratio of the silver halide to the organic silver salt in the range from 1 to 7 mol%, showed significant

suppression of print-out, compared to corresponding comparative samples 126 to 127 having a ratio of the silver halide to the organic silver salt of 10 or 27 mol%. As a person skilled in the art, I found that the suppression of print-out achieved by the presently claimed invention was uncxpectedly superior.

Table A

Sample No.	Halogen composition of Silver Halide (molar ratio)	Average Particle Size (nm)	Behenate Content (mol%)	Shape of Organic Silver Salt			Silver Halide/Organic Silver Salt (mol%)	Fog	Sensitivity	Print-out	Dmax	Remarks
				Shorter Axis (μm)	Longer Axis (μm)	Variation Coefficient of Grain Size						
101	AgBr:AgI=98:2	70	82	0.5	7.1	63%	1	0.35	115	0.22	3.2	Comp. Ex.
102	AgBr:AgI=98:2	70	82	0.5	7.1	63%	7	0.37	132	0.28	3.2	Comp. Ex.
103	AgBr:AgI=98:2	70	82	0.5	7.1	63%	10	0.38	137	0.42	3.2	Comp. Ex.
104	AgBr:AgI=98:2	70	82	0.5	7.1	63%	27	0.44	148	0.62	3.5	Comp. Ex.
105	AgBr:AgI=98:2	50	82	0.5	7.1	63%	1	0.32	105	0.21	3.4	Comp. Ex.
106	AgBr:AgI=98:2	50	82	0.5	7.1	63%	7	0.34	122	0.25	3.5	Comp. Ex.
107	AgBr:AgI=98:2	50	82	0.5	7.1	63%	10	0.37	126	0.39	3.5	Comp. Ex.
108	AgBr:AgI=98:2	50	82	0.5	7.1	63%	27	0.41	135	0.55	3.7	Comp. Ex.
109	AgBr:AgI=60:40	70	82	0.5	7.1	63%	1	0.33	110	0.20	3.1	Comp. Ex.
110	AgBr:AgI=60:40	70	82	0.5	7.1	63%	7	0.35	128	0.25	3.2	Comp. Ex.
111	AgBr:AgI=60:40	70	82	0.5	7.1	63%	10	0.36	133	0.38	3.2	Comp. Ex.
112	AgBr:AgI=60:40	70	82	0.5	7.1	63%	27	0.40	145	0.58	3.4	Comp. Ex.
113	AgBr:AgI=60:40	50	82	0.5	7.1	63%	1	0.30	100	0.18	3.4	Comp. Ex.
114	AgBr:AgI=60:40	50	82	0.5	7.1	63%	7	0.32	117	0.21	3.5	Comp. Ex.
115	AgBr:AgI=60:40	50	82	0.1	3.9	47%	8	0.33	116	0.21	3.5	Comp. Ex.
116	AgBr:AgI=60:40	50	82	0.5	7.1	63%	10	0.35	121	0.35	3.5	Comp. Ex.
117	AgBr:AgI=60:40	50	82	0.5	7.1	63%	27	0.38	130	0.52	3.6	Comp. Ex.
118	AgBr:AgI=20:80	45	40	0.05	4.5	58%	1	0.25	112	0.04	3.8	Comp. Ex.
119	AgBr:AgI=20:80	45	40	0.1	3.9	47%	1	0.21	100	0.04	3.6	Invention
120	AgBr:AgI=20:80	45	40	0.15	2.9	48%	1	0.20	98	0.04	3.5	Invention
121	AgBr:AgI=20:80	45	40	0.2	2.9	60%	1	0.18	82	0.04	3.0	Comp. Ex.
122	AgBr:AgI=20:80	45	40	0.05	4.5	58%	7	0.28	107	0.04	3.6	Comp. Ex.
123	AgBr:AgI=20:80	45	40	0.1	3.9	47%	7	0.23	95	0.04	3.4	Invention
124	AgBr:AgI=20:80	45	40	0.15	2.9	48%	7	0.21	93	0.04	3.3	Invention
125	AgBr:AgI=20:80	45	40	0.2	2.9	60%	7	0.19	75	0.04	2.8	Comp. Ex.
126	AgBr:AgI=20:80	45	40	0.1	3.9	47%	10	0.25	60	0.06	2.5	Comp. Ex.
127	AgBr:AgI=20:80	45	40	0.1	3.9	47%	27	0.27	60	0.06	2.6	Comp. Ex.
128	AgBr:AgI=20:80	5	40	0.05	4.5	58%	1	0.22	66	0.03	4.2	Comp. Ex.
129	AgBr:AgI=20:80	5	40	0.1	3.9	47%	1	0.17	50	0.03	4.2	Invention
130	AgBr:AgI=20:80	5	40	0.15	2.9	48%	1	0.18	48	0.03	4.3	Invention
131	AgBr:AgI=20:80	5	40	0.2	2.9	60%	1	0.18	38	0.03	3.2	Comp. Ex.
132	AgBr:AgI=20:80	5	40	0.05	4.5	58%	7	0.24	53	0.03	4.1	Comp. Ex.
133	AgBr:AgI=20:80	5	40	0.1	3.9	47%	7	0.18	43	0.03	4.1	Invention

134	AgBr:AgI=20:80	5	40	0.15	2.9	48%	7	0.19	41	0.08	4.2	Invention
135	AgBr:AgI=20:80	5	40	0.2	2.9	60%	7	0.18	32	0.03	2.8	Comp. Ex.
136	AgBr:AgI=20:80	5	40	0.1	3.9	47%	10	0.23	20	0.05	2.5	Comp. Ex.
137	AgBr:AgI=20:80	5	40	0.1	3.9	47%	27	0.22	18	0.05	2.4	Comp. Ex.
138	AgI=100	45	70	0.05	4.5	58%	1	0.25	100	0.01	3.8	Comp. Ex.
139	AgI=100	45	70	0.1	3.9	47%	1	0.18	88	0.01	3.8	Invention
140	AgI=100	45	70	0.15	2.9	48%	1	0.18	86	0.01	3.7	Invention
141	AgI=100	45	70	0.2	2.9	60%	1	0.18	70	0.01	3.1	Comp. Ex.
142	AgI=100	45	70	0.05	4.5	58%	7	0.27	95	0.01	3.6	Comp. Ex.
143	AgI=100	45	70	0.1	3.9	47%	7	0.19	83	0.01	3.7	Invention
144	AgI=100	45	70	0.15	2.9	48%	7	0.19	81	0.01	3.6	Invention
145	AgI=100	45	70	0.2	2.9	60%	7	0.19	65	0.01	3.1	Comp. Ex.
146	AgI=100	45	70	0.1	3.9	47%	10	0.20	52	0.02	2.5	Comp. Ex.
147	AgI=100	45	70	0.1	3.9	47%	27	0.21	48	0.02	2.3	Comp. Ex.
148	AgI=100	5	70	0.05	4.5	58%	1	0.22	80	0.00	4.4	Comp. Ex.
149	AgI=100	5	70	0.1	3.9	47%	1	0.16	70	0.00	4.4	Invention
150	AgI=100	5	70	0.15	2.9	48%	1	0.16	68	0.00	4.5	Invention
151	AgI=100	5	70	0.2	2.9	60%	1	0.16	55	0.00	3.2	Comp. Ex.
152	AgI=100	5	70	0.05	4.5	58%	7	0.23	70	0.00	4.6	Comp. Ex.
153	AgI=100	5	70	0.1	3.9	47%	7	0.16	62	0.00	4.6	Invention
154	AgI=100	5	70	0.15	2.9	48%	7	0.16	58	0.00	4.3	Invention
155	AgI=100	5	70	0.2	2.9	60%	7	0.16	47	0.00	3.2	Comp. Ex.
156	AgI=100	5	70	0.1	3.9	47%	10	0.15	32	0.00	2.5	Comp. Ex.
157	AgI=100	5	70	0.1	3.9	47%	27	0.15	22	0.00	2.4	Comp. Ex.

Conclusion:

As a person skilled in the art, I believe that the presently claimed invention achieves unexpected improvement in the balance of fogging, sensitivity and Dmax, and unexpectedly remarkable suppression of print-out.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

DATE: July 18, 2007

Tomoyuki Ohzeki

Tomoyuki Ohzeki

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of
Tomoyuki OHZEKI
Application No.: 10/635,486
Filed: August 7, 2003
For: PHOTOTHERMOGRAPHIC MATERIAL

Docket No.: FSF-031421
Group Art Unit: 1752
Examiner: Thorl Chea

REVISED DECLARATION UNDER 37 C.F.R. §1.132

Commissioner of Patents and Trademarks
Alexandria, VA 22313-1450

Sir:

I, Tomoyuki Ohzeki, do declare and state as follows:

I graduated from Waseda University with a Master's Degree in Science and Engineering, Department of Chemistry in March 1988;

I joined Fuji Photo Film Co., Ltd. (currently FUJIFILM Corporation) in April 1988, and since 1988, I have been engaged in research and development in the field of silver halide emulsions and photothermographic materials;

I am a person of ordinary skill in the photothermographic material art;

I am familiar with the Office Action of February 22, 2006, and understand that the Examiner has rejected Claims 1 to 6 and 8 to 20 as being unpatentable over the combination of prior art references; and

I am the inventor of the invention.

I make the following statement in order to clarify the advantages of the present invention.

Experiment A:

Photothermographic material samples were prepared in the same manner as sample 12 prepared in Example 1 described in Kawahara, except that the silver iodide content in the silver halide, the average particle size of the silver halide, and the coating amount of the silver halide per 1 mol of the organic silver salt were changed to the values shown in Table A below. The photothermographic material samples obtained were exposed and thermally developed in the same manner as in Example 1 described in the specification of the present application. Then, the sensitivity and the fog of the samples were measured in the same manner as in Example 1 described in the present application. The results are shown in Table A below.

As is clear from the results shown in Table A, it is understood that unexpected results (i.e., low fogging and significantly high Dmax) were produced when the following conditions described in newly added claim 21 are satisfied: (i) the silver iodide content is from 80 to 100 % by mol; (ii) the average particle size of the silver halide is from 5 to 50 nm; and (iii) the coating amount of the silver halide is from 0.5 to 15 % by mol per 1 mol of the organic silver salt. It is further realized that a smaller coating amount of the silver halide leads to higher sensitivity provided the silver iodide content and the average particle size are constant. This tendency is opposite to the

tendency observable with the silver halide having a high silver iodide content used in Kawahara in which an increase in sensitivity is achieved by increasing the coating amount of the silver halide. Therefore, the effects produced by the photothermographic material of claim 21 are considered to be unexpected from the prior art.

Table A

Sample No.	Silver Halide	Average Particle Size	Silver Halide/Organic Silver Salt	Fog	Sensitivity	Printout (ΔDmin)	Dmax	Remarks
1	AgBr:AgI=98:2	68nm	0.5 % by mol	0.26	85	0.13	2.0	Comp. Ex.
2	"	"	2 % by mol	0.28	91	0.21	2.2	Comp. Ex.
3	"	"	10 % by mol	0.31	97	0.35	2.3	Comp. Ex.
4	"	"	15 % by mol	0.35	101	0.42	2.5	Comp. Ex.
5	"	"	21 % by mol	0.42	102	0.51	2.7	Comp. Ex.
6	"	"	32 % by mol	0.45	105	0.61	2.8	Comp. Ex.
7	AgBr:AgI=20:80	50nm	0.5 % by mol	0.23	95	0.01	3.5	Claim 21
8	"	"	2 % by mol	0.22	86	0.01	3.5	Claim 21
9	"	"	10 % by mol	0.22	72	0.01	3.4	Claim 21
10	"	"	15 % by mol	0.21	58	0.02	3.3	Claim 21
11	"	"	21 % by mol	0.21	28	0.03	2.7	Comp. Ex.
12	"	"	32 % by mol	0.20	12	0.03	2.5	Comp. Ex.
13	AgBr:AgI=20:80	5nm	0.5 % by mol	0.21	32	0.00	4.5	Claim 21
14	"	"	2 % by mol	0.21	20	0.00	4.5	Claim 21
15	"	"	10 % by mol	0.20	11	0.00	4.3	Claim 21
16	"	"	15 % by mol	0.20	9	0.01	4.1	Claim 21
17	"	"	21 % by mol	0.19	5	0.01	3.7	Comp. Ex.
18	"	"	32 % by mol	0.19	2	0.01	3.5	Comp. Ex.
19	AgI	50nm	0.5 % by mol	0.21	100	0.00	3.8	Claim 21
20	"	"	2 % by mol	0.21	91	0.00	3.7	Claim 21
21	"	"	10 % by mol	0.20	76	0.01	3.7	Claim 21
22	"	"	15 % by mol	0.19	61	0.01	3.6	Claim 21
23	"	"	21 % by mol	0.19	29	0.02	3.2	Comp. Ex.
24	"	"	32 % by mol	0.18	13	0.03	3.0	Comp. Ex.

25	AgI	5nm	0.5 % by mol	0.19	34	0.00	4.6	Claim 21
26	〃	〃	2 % by mol	0.19	21	0.00	4.6	Claim 21
27	〃	〃	10 % by mol	0.18	12	0.00	4.4	Claim 21
28	〃	〃	15 % by mol	0.18	9	0.00	4.4	Claim 21
29	〃	〃	21 % by mol	0.17	5	0.01	4.1	Comp. Ex.
30	〃	〃	32 % by mol	0.17	2	0.01	3.9	Comp. Ex.

The sensitivity values shown in Table A are relative values assuming that the sensitivity of sample 19 bc 100. The use of the silver halide having a silver iodide content of 2 mol% used in Kawahara resulted in inferior fogging property, printout, and Dmax. When the silver halide having a silver iodide content of 2 mol% used in Kawahara is used, the dependency of the sensitivity on the silver halide quantity is small, and a greater silver halide quantity resulted in slightly higher sensitivity and slightly higher Dmax (conventional knowledge). When the silver halide having a silver iodide content of 2 mol% used in Kawahara is used, a greater silver halide quantity resulted in inferior fog and inferior printout (conventional knowledge). When the silver halide having a high silver iodide content according to claim 21 of the present application is used, a smaller silver halide quantity unexpectedly resulted in higher sensitivity, higher Dmax, and better printout property.

Conclusion: As a person skilled in the art, I believe that the sensitivity, Dmax, fogging, and the printout property showed unexpectedly remarkable results according to the invention described in claim 21.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

DATE: July 18, 2007

Tomoyuki Ohzeki

Tomoyuki Ohzeki